

Worked Examples Effects

Theory

The worked examples effect was first introduced in 1985¹⁾ suggesting positive effects of providing a learner with an example of the problem solution before requiring him to solve one on his own.

This suggestion is contrary to many **constructivist discovery learning** methods which suggest a learner should try to solve the problem by himself. **Cognitive load theory** on the other hand suggests that searching for the problem solution places unnecessary load on the learner's mind preventing him from learning. A worked example will remove the load of searching for a solution and enable easier acquisition of basic steps leading to the solution.

Practice

The image shows three separate worked examples for solving quadratic equations of the form $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

- Example 1:** $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4 \cdot 1 \cdot 3}}{2 \cdot 1}$
 $x = \frac{4 \pm \sqrt{16 - 12}}{2}$
 $x = \frac{4 \pm \sqrt{4}}{2}$
 $x = \frac{4 \pm 2}{2}$
 $x = 2 \pm 1$
 $x = 3 \quad \text{or} \quad x = 1$
- Example 2:** $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4 \cdot 1 \cdot 1}}{2 \cdot 1}$
 $x = \frac{2 \pm \sqrt{4 - 4}}{2}$
 $x = \frac{2 \pm \sqrt{0}}{2}$
 $x = \frac{2 \pm 0}{2}$
 $x = 1$
- Example 3:** $x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4 \cdot 1 \cdot 1}}{2 \cdot 1}$
 $x = \frac{1 \pm \sqrt{1 - 4}}{2}$
 $x = \frac{1 \pm \sqrt{-3}}{2}$
 $x = \frac{1 \pm \sqrt{3}i}{2}$
 $x = 0.5 \pm 0.866i$

Learners should be presented with a worked example of the procedure they're expected to learn prior to trying to solving a problem which requires that procedure. For example, when teaching learners the formula for calculating roots of a quadratic formula, learners should first be provided with a worked example of using the formula, and then try to solve a problem on their own.

Research status

1)

Sweller, John, and Graham Cooper. The Use of Worked Examples as a Substitute for Problem Solving in Learning Algebra. *Cognition and Instruction* 2: 59-89, 1985.

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